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LIGHT INDUSTRY IN COMMUNIST CHINA

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LIGHT INDUSTRY IN COMMUNIST CHINA

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Table of Contents

EXPERIENCES IN EXPANSION OF PIGSKIN PRODUCTION IN SHANTUNG

[This is a full translation of an article written by Li Ming appearing in Chung-kuo Ch'ing-kung-yeh (Chinese Light Industry), No 16, Peiping, 28 August 1958, page 4.]

During the past few years under the direct leadership of the Party and the government at various levels and with close synchronization and active coordination of all departments, distinct achievements were made in Shantung Province in the promotion of pigskin skinning work. With the exception of Ch'ang-wei and Lai-yang special districts whose inhabitants were historically accustomed to the practice of pigskin skinning, the overwhelming majority consumed pork with skin. Of 112 hsien and cities in the province, 90 were engaged in the pigskin skinning task. According to a preliminary estimate, the total volume of pigskin in 1958 would be the equivalent of 400,000 cowhides, which was an increase by more than 100 percent of the 1957 figure. The total quantity of pigskin procured by livestock departments since 1951 was equal to 1.03 times that of cowhide purchased for the corresponding period, reflecting most significantly the economizing of the consumption of cowhide, the support of the growth of industrial and agricultural production and the satisfying of the production needs of the leather industry as well as people's living requirements.

Fron our past experiences the following directives were drawn:

First, as a basic measure for assuring the development of pigskin skinning work, Party committees and the government at all levels should be relied upon to incorporate this work in our national plan and to achieve a balanced growth at various levels. In regard to the distribution of pigskin by state-operated companies, a uniform step was taken by the province to the effect that "all hogs slaughtered by the food industry for domestic consumption should be skinned according to plan and purchased in a unified manner by the livestock departments for distribution according to plan." Pigskin from slaughter by the masses should be actively purchased by the livestock departments. Pigskins, regardless of how and where they were procured, should be planned for on a yearly or seasonal

basis. The provincial People's Council should be entrusted with annual planning while seasonal planning should be left to the various departments concerned. Execution of these plans should be supervised by the people's councils at various levels. Emphasis on this work was shown, for example, at Tsinan City, a rather large supply center for domestic hog consumption, where the local Party committee and the government departments concerned not only convened conferences on pigskin skinning work but also handled inspection and testing work on the spot themselves, assisting in solving difficulties, ideological as well as technical, and in crowning this work with success.

Secondly, strengthening inter-departmental coordination and collaboration was considered essential to the performance of this task, mainly in respect to coordination among skinning, procurement, and supply and industrial production departments. On the basis of such close mutual understanding and constant collaboration, difficulties were overcome and activities were successfully and rapidly developed. To cite an example, the purchasing department voluntarily set aside two percent of its pigskin sales profit as a subsidy for the food industry in view of the definite losses incurred by it. In the interest of coordination, industrial production departments were allowed to order pigskin splitting units directly under a unified plan so as to reduce intermediary transactions and to lower the cost of production. After adopting this new measure, not only was the above problem resolved adequately but production was further benefited. Pigskin skinning methods were promoted through mutual aid and cooperation. The food industry was mainly concerned with the procurement and distribution of hogs, leaving organization and training for skinning to the livestock department, while the industrial departments constantly directed the improvement of skinning technique to meet production needs. This collaboration resulted in an assurance of pigskin in both quality and quantity.

Thirdly, the following problems should be solved: (1) People were reluctant to purchase skinned pork for fear of the hog being diseased; (2) the pigskin skinning departments feared reduced proceeds from skinned hogs; (3) there was a lag in skinning technique; and (4) the meat supply was jeopardized. Our counter-measures followed:

(1) In support of national construction, the masses were informed of the economic and political significance of pigskin skinning work for industrial production in the interest of national construction and export needs. Through

such publicity work, people in most areas supported our measure. It was welcome to the inhabitants of Tzu-po municipality although they were previously not accustomed to the consumption of skinned pork. For promotional reasons, cadres of public organizations led in eating skinned pork. Simultaneously, slaughterers at state-operated house were educated in the regard, contributing in an important manner to the accomplishment of this work and the improvement of pigskin quality.

(2) In view of difficulties arising from the fact that pigskin skinning was not practised by the inhabitants of south and west Shantung, it was necessary to organize and train them in this technique. To remedy the situation, over 20 trained technicians were transferred to these areas from Lai-yang district by order of the livestock departments concerned. In some areas hog slaughterers' on-the-spot conferences were held constantly for the propagation of common sense on skinning and for mutual emulation of its technique, overcoming gradually the lag in technical training.

(3) Ways and means were devised to make up for the loss in meat supply from pigskin skinning. In Tsinan City for instance, the masses were alerted by the foods department to actively consider and examine the problem of eating domestic rabbit and dog meats in order to increase meat supplies in kind and quantity. People's reaction to the suggestion that sausages be stuffed with odds and ends from pig's heads was favorable.

(4) Procurement prices for pigskin should be accurately and adequately adjusted on a "non-loss and non-profit" principle with a rational price range for all areas according to a scale for loss in each area and its traditional practice. Through this adjustment in price, the interests of both producers and pigskin skinners were safeguarded. At the same time, skins needed for industrial production were procured directly at the slaughter house by the livestock department according to plan. For these transactions, only two per cent was charged for service so as to develop pigskin skinning work, to lower industrial production cost and to stabilize the price for finished products.

It should be noted that in carrying the above measures out, the Party leadership at all levels, close inter-departmental coordination and the mass line should be depended upon to achieve good results.

THE METHOD USED BY THE HUNG-HSING PEOPLE'S COMMUNE IN SHANGHAI TO MANUFACTURE CHEMICAL FERTILIZER FROM WASTE LEATHER

/This is a full translation of an unsigned article appearing in Chung-kuo Ch'ing-kung-yeh (Chinese Light Industry), No 17, Peiping, 13 September 1958, page 25. The manuscript is supplied by the Leather Department of the Ministry of Light Industry./

In the course of the Great Leap Forward in farm production, the Hung-hsing Farm Commune, Branch 10, in the western suburb of Shanghai City, established a chemical fertilizer and an industrial chemical factory with waste leather and waste hydrochloric acid respectively as raw materials. The operation was conducted by an acid hydrolysis process. The principal components of these chemical fertilizers consisted of ammonium, phosphorus and potassium chloride, containing 38.51 grams of chlorine per liter in the liquid state. Known results revealed that the fertilizers could be applied effectively to paddy rice as well as cotton, turnip and vegetable crops, and were particularly adapted to fiber crops such as cotton. In quality they surpassed soybean cake and in cost of production they were lower. This chemical works, simply equipped as it was, completed in a few days at a cost of only 200 yuan. Since its inception two weeks ago, over 30 tons of chemical fertilizer were produced, thus offering the commune a material foundation for a bumper yield.

The workshop was a thatched bungalow surrounded by brick walls, 9 by 9 meters in dimension, occupying an area of 81 square meters. Its principal equipment consisted of 4 large tanks, one meter in diameter at the top and 80 centimeters in depth. They were laid out in a row to form a brick-walled furnace for intensive heating and funnels were built around each tank. At the base of two tanks which formed a heating unit, a firing bed with a smoke stack, over 20 feet in height, leading out at the top was installed. Other tools consisted of wooden clubs, iron shovels and forks, screens, etc.

This simple method of production could be easily learned and little technical skill was required. Into each tank 5 to 6 jars of waste hydrochloric acid, equivalent to 275 to 330 chin were poured, into which gradually bits of vegetable and chrome tanned waste leather were added.

The compound was coal-fired. Into each tank were dropped 300 chin of waste leather, to be completed in over 20 hours. While no fixed ratio between vegetable and chrome tanned waste leather was given, the rule was half and half in proportion. Firing was halted when the waste leather was emptied into the tank. After cooling off, neutralization was achieved by the addition of 20 to 31 chin of block lime, test paper being used to measure the pH until a high point of 6 to 7 was reached. To prevent spilling and foaming, lime should be added gradually too. It would take 24 hours to complete the reaction including neutralization. Upon completion of the reaction, the solution was allowed to cool off to room temperature before it was emptied into a jar for storage without further concentration. It was diluted with five parts of water before application. At the bottom of the jar balck sediments were formed which could be dried in sunlight, broken up and sieved. These fine particles could be used as fertilizer. In strength they were equal to soybean cake. In each jar there were 400 chin of liquid and sediment, about 50 and 50 in proportion. At the works four tanks were operated by three batches of workers and 1,600 chin of chemical fertilizer were produced in every 24 hours.

While no detailed figure was given for the production cost of chemical fertilizer, a rough estimate was made evailable. To produce a ton of chemical fertilizer would require 1,500 chin of waste leather at 0.03 yuan per chin, or 45 yuan; 30 jars of waste hydrochloric acid (which was available without cost) at 0.16 yuan per jar for transportation charge, or 4.8 yuan; 400 chin of coal at 1.5 yuan per 100 chin, or 6 yuan; and 155 chin of lime at 0.02 yuan per chin, or 3.1 yuan. The total cost of production would be 58.9 yuan.

An analysis made at East China Normal College indicated that 100 chin of waste leather chemical fertilizer were equivalent to 16 chin of ammonium sulfate, or a ratio of one metric ton to 320 chin of ammonium sulfate. Computed at a cost of 51.2 yuan for 320 chin of ammonium sulfate, or 320 yuan per metric ton, its production cost was a little higher than that of ammonium sulfate. Considering the simplicity of factory equipment, the easy method of production and the availability of waste materials for utilization such as waste leather from leather factories and waste hydrochloric acid from chemical works, it would be worth while to promote production of chemical fertilizer by this method while factories for manufacturing ammonium sulfate are not generally established in China.

EXPERIENCES IN EXPERIMENTAL MANUFACTURE OF GLASS FERTILIZER

/This is a full translation of an article appearing in Chung-kuo Ch'ing-kung-yeh (Chinese Light Industry), No 17, Peiping, 13 September 1958, page 28. The manuscript is prepared by the Glass and Enamel Industrial Company of Shanghai City./

Scientific research reveals that in addition to chemical elements such as potassium, phosphorus, nitrogen, etc., as basic nutritional matter, plant life requires for its growth very slight amounts of such trace elements as boron, manganese, copper, zinc, molybdenum, etc. as subsidiary nutritional aids. Inasmuch as little is absorbed by plant life in this regard, the production of such fertilizers calls for precision. Not only should its solubility meet the requirement for absorption by plant life, but also it should be of such strength as not to be easily washed away by rain-water.

To meet this requirement, glass fertilizer is prepared with such trace elements as copper, zinc and molybdenum, melted with glass containing phosphorus and potassium and ground into fine particles. Trace elements as found in glass fertilizer resist not only erosion by rain-water but also absorption by soil as these fine glass particles are absorbed directly by the plant roots. No harm would result from over-fertilization. Glass fertilizer is an extremely effective agent in that a kilogram of this fertilizer is needed to fertilize a square decameter of tillable land. With this sustained strength no further fertilization is required.

According to Soviet research, the yield of a flax crop would increase by 12 percent with glass fertilizer containing "manganese"; and 59 percent with glass fertilizer containing "zinc". The yield of a spring wheat crop would increase by 22 percent with glass fertilizer containing "copper". In short, it was particularly effective for the planting of corn, rice and vegetables in areas where precipitation was abundant.

By cooperating with East China College of Industrial Chemistry and the Institute of Silicate Research of the Department of Light Industry with supplementary reference materials from abroad, our Company experimentally manufactured 9 varieties of glass fertilizer in a preliminary manner. Their compositions were as follows:

(1) Basic glass: (SiO_2) 38.8%, (P_2O_5) 35.02%, (Fe_2O_3) 5%, (MnO_2) 4%, (CaO) 8.2%, (MgO) 8.2%, (K_2O) 9.2% and (Na_2O) 11.21%;
Trace elements present: (Fe) 12.5%, (Mn) 4.9%, (Ca) 2%, (Zn) 4%, (B) 8.2% and (Mo) 0.13%.

(2) Basic glass: (SiO_2) 7%, (P_2O_5) 12%, (CaO) 40%, (Fe_2O_3) 10%, (MgO) 2% and (K_2O) 5%.
Trace elements present: (Fe) 12.5%, (Mn) 4.9%, (Ca) 2%, (Zn) 4%, (B) 2% and (Mo) 0.13%.

(3) Basic glass: Except for (K_2O) 3%, other components were the same as (2).
Trace elements present were the same as (2).

(4) Basic glass: Except for (K_2O) 1%, other components were the same as (2).
Trace elements present were the same as (2).

(5) Basic glass: Except for (K_2O) 0.5%, other components were the same as (2).
Trace elements present were the same as (2).

(6) Basic glass: (SiO_2) 38.8%, (P_2O_5) 20.9%, (Fe_2O_3) 5%, (MnO_2) 4%, (CaO) 8.2%, (MgO) 8.2%, (K_2O) 9.2% and (Na_2O) 9.2%.
Trace elements present: (Mn) 16.63% and (B) 4%.

(7) Basic glass: Components were the same as (6).
Trace elements present: (Fe) 7%, (Mn) 2.52%, (Ca) 3.2%, (Zn) 3.2%, (B) 0.63% and (Mo) 0.13%.

(8) Basic Glass: Components were the same as (6).
Trace elements present: (Mn) 15.12% and (B) 4.8%.

(9) Basic glass: Components were the same as (6).
Trace elements present: (Fe) 3.5%, (Mn) 1.26%, (Ca) 1.6%, (Zn) 1.6%, (B) 0.63% and (Mo) 0.07%.

In selecting raw materials, we were confronted with the cost problem on the farm. In this connection, waste slag from iron and steel works was utilized as substitute for basic glass (2), (3), (4) and (5) in order to increase agricultural production.

Melting was done in a small testing crucible. For trial manufacture of three specifications, melting was done in a semi-gas-fired crucible furnace at a temperature of 1400 to 1450°C. Because of the presence of phosphorus and iron in the raw material and because of the high furnace temperature, corrosion was noted to have occurred at the base and on the upper wall of the crucible which was perforated during melting. Large crucibles cracked up and material was lost through leakage. After three trial operations, it was established that ordinary crucibles would not stand melting. Subsequently, melting was done in graphite crucibles in a gas furnace at a controlled tem-

perature of about 1300°C. It took 2 to 3 hours to add ingradients to the melting pot. The furnace could be opened 50 minutes after closing when the molten material was dumped into cold water where crushed blocks were formed. During melting in a graphite crucible, a metallic reduction reaction was observed.

Judging by these trial results, no technical difficulty was encountered in the production of glass fertilizer but its adaptibility to actual conditions in China with reference to soil composition in different areas and the need for trace fertilizer by plant life remained to be further analyzed and examined by the agricultural departments concerned.

RECOMMENDATIONS FROM MODERN EXPERIENCE IN THE PAPER INDUSTRY FROM THE LABOR HEROES CONFERENCE

[This is a full translation of a compiled article appearing in Tsao-chih Kung-yeh (Paper Industry), No 12, Peiping, 7 December 1959, pages 13-15.]

Compiler's note:

At a national delegates conference attended by advanced producers, collective and otherwise, in the field of industry, communication and transportation, capital construction, finance and trade and before a meeting in which advanced experiences in the field of light industry were exchanged, representatives of the advanced paper industry, collective and otherwise, mutually engaged in an exchange of experience on 138 items. The contents were unusually rich. Included among other things were important creations on concrete measures for improving quality, new patterns for labor contests and "point and drop" method in the interest of production. To synchronize with the mass movement being enthusiastically conducted for the advancement of enterprises by "following, comparing with and overtaking the advanced and by aiding the backward" and to publicize these advanced experiences, apart from recommendation by special articles in this and subsequent numbers, achievements of general significance are briefly recommended as follows:

Shanghai City

Some measures for raising the drying capacity of a paper making machine

A paper making machine equipped with a single drying tank: (1) The roller was lowered below the center water level of the drying tank as the flannel-covered roller in front of its supporting rod was raised so as to increase the effective area of the drying tank. (2) A sealed cover for the drying tank was adopted. (3) High pressure hot air was blown over the tank surface by using a hot air blower. (4) Hot air was directed against the wet surface behind the supporting rod.

A paper making machine equipped with multiple drying

tanks: (1) A 20% increase in production was brought about by the use of a gas infra-red ray in pressing and drying workshops. (2) Hot air was driven in when newsprint was being produced and the machine speed was accelerated from 100 meters per minute to 120 meters per minute. (3) Temperature in a drying tank would rise without increasing pressure therein by adopting a superheat evaporation method. (4) Heavyweight paper was produced without using canvas. In connection with a machine equipped with a single drying tank, preparation was under way under way for a test of (3) and it was estimated that production capacity would rise by 20 percent.

Taiyuan Paper Mill
(Taiyuan City, Shansi Province)

Treatment of Kaoliang Stalk with Sodium Sulfite and Sodium Sulfide

Chemicals consisted of sodium sulfite 18% and sodium sulfide 4% at 1:3 liquid ratio. Pressure was placed at 5 kilograms per square centimeters. It took 2:20-2:30 to complete the operation, including 30 minutes for the temperature to rise to a level desired and an hour for the temperature to be maintained. Potassium permanganate content in the pulp was estimated at 30 milliliters as per Tappi measurement. Bleaching rate (effective chlorine) was placed at 2.61%. No caustic soda was used, and the boiling period was shortened by half.

Kan-nan Paper Mill
(Kan-chou City, Kiangsi Province)

Expediting Preparation of Ricestalk Pulp by the Alkaline Method

Ricestalk was cut into strips of 50-60 millimeters in length at 85-90% proficiency. Steaming and boiling conditions: capacity at 135 kilograms per cubic meter, NaOH at 6%, liquid ratio at 300%, liquid temperature at 85-90°C, maximum pressure at 6.33 kilograms per square centimeter and total time -- 85 minutes. The compressed spraying method was adopted for releasing pulp (spraying pressure at 6.33 kilogram per square centimeter. Crude pulp recovery rate was placed at 50-55% while the bleaching rate (effective chlorine) was fixed at 6%. The rise in temperature proceeded at 0 to 1.76 kilograms per square centimeter at 0:03 ratio, 1.76 to 0.35 kilograms per square centimeter at 0:02 ratio and 0.35 to 6.33 kilograms per

square centimeter at 0:10 ratio. Maintenance of temperature waz given at 0:20. The spraying method was adopted by the mill as its distinct contribution.

Shanghai City

Reducing Mutilated Paper and Rsising Production Rate

An anti-mutilation line was attached to the pressing cylinder in paper making machine equipped with single drying tank in which was installed a lubricated rod.

Tsitsihar Paper Mill
(Tsitsihar City of Heilungkiang Province)

Paper Making Machine Equipped With Double-Web and Double-Tank to Eliminate Wet-Paper Fuzzy Surface and Folding Marks

By substituting for the upper pressing roller a rubber roller of 82-85^{o} "hsiao-erh" hardness and by stepping up machine speed from 120 meters per minute to 150 meters per minute, the "life span" of the upper flannel cloth was lengthened by 3 to 4 days, and a vacuum pump of 75 millimeters diameter would be dispensed with.

Hung-yeh Paper Mill
(Hu-shu-kuan, Soochow, Kiangsu Province)

Raising Production Capacity of Straw Paper Board Making Machine

Not only were pressings raised from four to five but also the diameter of the pressing roller was increased from 250 millimeters to 400 millimeters in order to extend its linear pressing capacity and to lower moisture content in the paper by 3 to 4% before drying in the tank.

Chen-chiang Paper Mill
(An-tung Municipality, Liao-ning Province)

Paper Issuing at Both Ends From Machine Equipped With Double-Drying Tanks

By installing a web-groove in front of a machine producing thin paper with double-drying tanks and by converting the second drying tank into a single-flannel and single-tank machine, paper would issue at both ends, the drying tank being 1015 millimeters in diameter and the

machine being 1220 millimeters in width. It was possible to produce both thin and thick paper. Not only was transmission installation put on an economical basis but the machine was rendered highly maneuverable. Production capacity for container paper of 100 grams per meter reached 7.2 tons per day.

Nan-p'ing Paper Mill
(Nan-p'ing City, Fukien Province)

Scrapers Made With Thin Insulating Plastic Board

Since insulating plastic board was employed as substitute for copper or steel for making scrapers attached to drying tanks and pressing rollers, their durability had increased. Not only were copper and steel saved but there was a numerical reduction in inspecting and repairing scrapers and pressing rollers as well. The operating time of the machine was also prolonged.

Hua-feng Paper Mill
(Hangchow City, Chekiang Province)

Installation of Water-Absorbing Scrapers in Pressing Area

By placing water-absorbing scrapers under the pressing roller, water would not gush over the rod when machine speed was stepped up. This absorption device was operated by a vacuum pump of 10 millimeter diameter. By using this device, the mositure content in paper would decrease by 1.5 percent, and the cigarette paper machine speed could reach 180 meters per minute. In the absence of vacuum pressing rollers, this was an effective measure to cope with gushing water when the machine speed was accelerated.

Hsin-min Paper Mill
(Hsin-min Hsien, Liaoning Province)

A Wooden Paper Making Machine Constructed in 13 Days

The drying tank was dispensed with. Moist paper was dried over a 12-mesh iron screen above a 12-meter fire tunnel, a 15 h.p. generator being used to produce 2.5-3.0 tons of straw paper board per day at a total installation cost of over 3,000 yuan.

An-tung Paper Mill No.3
(An-tung City, Liao-ning Province)

Long-Web Newsprint Making Machine Without an Upper Conditioning Roller

A rubber roller installed on the web of the lower conditioning road would rotate in a normal manner without an upper conditioning device as the web turned on the lower rod. To maintain moisture content at 84 percent, absorption tanks were increased from 5 to 7, and a vacuum pump, 150 millimeters in diameter, was added. Edge cutting needles were placed beside the absorption tanks. By dispensing with the upper rod, a saving in flannel covering was achieved and the durability of the copper screen was extended from about 20 days to a maximum of 45 days and machine speed was stepped up from some 160 meters to 184 meters per minute. Paper breakage was reduced noticeably.

An-tung Paper Mill No 2
(An-tung City, Liao-ning Province)

To Increase Drying Capacity of Single-Tank Circular Net Paper Making Machine

By readjusting the supporting rods, the effective drying area in a tank could be increased and by delivering hot air from a native-style furnace, air circulation became quickened. Through these alterations the machine speed for glazed paper production increased from some 80 to 124 meters per minute, or 32 grams per square meter. In producing glazed paper of 40 grams per square meter, the speed would be comparable to 149 meters per minute for glazed paper or 32 grams per square meter. Production rate was placed at 99.8 percent while finished products came off the production line at over 98 percent.

Chen-chiang Paper Mill
(An-tung City, Liao-ning Province)

To Economize Flannel Consumption

By coating metallic roller with nitric acid fiber paint, it was possible to increase the durability of the attached flannel cloth by three days.

To Increase Drying Capacity of Paper Making Machine

By inserting steam piping in the drying tank instead of putting it through the smoke stack of a small furnace, production capacity was observed to have increased by one ton.

T'ang-shan Paper Mill

To Save Coal and Gas

By reclaiming condensed water, by preserving the temperature and by installing more heat sprayers under the chimney, 600 tons of coal were saved in 9 months.

Tientsin People's Paper Mill No 1

To Shorten Inspection and Repair Period

It was possible to shorten the period for inspecting and overhauling paper making machines from 15 days to 9 days. The time set for minor periodic inspection and repair -- 24 hours per month -- could be utilized for production when a system of area responsibility for inspection and reporting was established. There should be more division of labor and better preparatory work, and inspection and repair work should be undertaken while flannel cloth and copper nets were changed.

Mo-yuan Paper Mill
(Chiang-tung Hsien, Fukien Province)

Hand-Made Paper to Be "Five-Modernized"

It was necessary to make paper on a "hanging lattice", to produce pulp by hydraulic power, to transport paper by cable, to dry paper by continuous devices and to produce paper at the mill. In so doing, production capacity increased by 1.5 times, man-power was cut back by half, and production costs also dropped by 50 percent.

Tu-yun Paper Mill
(Tu-yun City, Kweichow Province)

Paper Making Machine Equipped With New-Type Pulp Vat and Drying Tank

It was possible to produce high-quality long-fiber

copying paper and wax paper. In making long-fiber paper, hand labor was substituted by machine work.

Hsin-hsiang Paper Mill
(Hsin-hsiang City, Honan Province)

Planned Capacity for Small Gas-Fired Tank Machine Superceded

By using model 2251 combusion equipment, daily production capacity rose from 800 to 1500 kilograms.

Li-yung Paper Mill
(Wu-hsi City, Kiangsu Province)

Rapid Steaming of Ricestalk Pulp by Alkaline Method

By immersing 85 percent of ricestraw strips of 18-25 millimeter length in a solution containing 9% NaOH and 2% NaS, by keeping moisture content of raw material at a liquid ratio of 260%, by maintaining chemicals to be emptied into the mixing vat at an 85-90°C temperature and by keeping maximum pressure at 4.6-4.9 kilograms per square centimeter, it was possible to increase the holding capacity of the vat and to shorten the time for steaming to 70 minutes for each atch. Not only was the capacity index raised to a maximum of 2000 kilograms per cubic meter but the quality of pulp was improved also.

Pulp Production With Rags by Natural Acid Fermentation Method

By leaving immersed rags to ferment naturally for 7 to 10 days, pulp could be produced in 4 hours without further steaming, comparable to time required for pulp production with steaming. Neither alkali nor lime was employed, and no steaming equipment was needed.

Yin-k'ou Paper Mill
(Yin-k'ou Municipality, Liao-ning Province)

Energentically Promoting a Technique Demonstration Contest

(1) To step up publicity work and to enter deeply into the ideological field. (2) To undertake ordinary demonstration work in order to break through the important obstacles in the weak links of the present production chain.

Coordination in rapid chopping of reeds, efficient packing for steaming and production of better quality pulp was demonstrated. After the demonstration, time needed for changing the cutting knife was shortened to 6 minutes and packing time was reduced from an hour and 40 minutes to 26 minutes. In employing different methods to cope with different working units, three different demands were brought up. In demonstrating technique, the entire body of employees and workers were called upon to participate in a "three-demonstration-three-contest" movement. The technicians should outdo their technical supervisors in experience and in solving key problems; employees should excel in administrative work in the interest of production skill and ideological perfection; and workers should strive for operational and economic efficiency, solidarity and mutual aid. Technical contests should be held individually and collectively -- "soldier against soldier, general against general, individual against individual, cell against cell, sector against sector, workshop against workshop and dragon-like unit against unit." A contest between single-type work units and multiple-type coordinated units should also be conducted. (4) To raise the technical level nad to achieve the objective of high-speed development in technical tactics, there should be a line-up in technical demonstrations, technical research, technical summarization and technical education. (5) Mutual learning and assistance activities should be promoted; advanced accomplishments should be held in high regard and opportunely timed criticism contests held; and "red flag exemplary heroes" should be emulated. These technical contests were held for the benefit of new workers and apprentices. Working efficiency rose by 1 to 5 times for 21 workers; 6 to 10 times for 22 workers; and 11 to 72 times for 11 workers. Of 314 proposals for technological and technical revolution, 231 were already put into effect.

PROGRESSIVE SMALL INDIGENOUS TYPE PAPER MILLS

[This is a full translation of an article written by Chiang Shih-huai and Kuo Tu-li appearing in Tsao-chih Kung-yeh (Paper Industry), No 12, Peiping, 7 December 1959, page 47.]

Under the Party's general line for Socialist construction and the "walking with two legs" policy, it was possible for small paper mills to produce experimentally, in the course of a year, 935 paper making machines with a daily total production capacity of 968 tons. Of these units, 508 were in normal production and 140 units were reported to have exceeded the planned capacity. By one leap after another, the production figure for the third quarter already exceeded that for the first half year by 13.81 percent, and a 9663 mark was reached in October, accounting for 66.57 percent of the third quarter figure and testifying to the vitality of the small indigenous type paper mills. These achievements would be consolidated and substantiated unceasingly under the glorious direction of the Party's general line for Socialist transformation, developing at a rapid pace ad constituting a strength not to be slighted in the rapid development of the paper making industry. Listed hereunder were units in various provinces that had exceeded their planned capacity:

Name of Province or City	Number of Units
Grand Total	140
Honan	36
Szechuan	14
Heilungchiang	10
Hopei	10
Peiping City	8
Kwangtung	8
Liaoning	7

Name of Province or City	Number of Units
Kirin	6
Fukien	6
Kweichow	6
Kansu	5
Kiangsu	5
Hupeh	4
Shantung	3
Kiangsi	3
Chekiang	2
Hunan	2
Shansi	2
Yunnan	1
Chuang National Autonomous Region, Kwangsi Province	1
Shensi	1

EXPANSION OF LEATHER RESOURCES, FULL DEVELOPMENT OF THE INDUSTRIAL POTENTIAL, ACCELERATION OF THE GREAT LEAP FORWARD IN THE LEATHER INDUSTRY

/This is a translation of an editorial appearing in Chung-kuo Ch'ing-kung-yeh (Chinese Light Industry), No 16, 28 August, 1958, page 2./

Like other industries, the leather industry showed immense growth during the national Great Leap Forward period. Thanks to the direction of the Party committees at various levels and industrial departments as well as the active effort of entire corps of employees and workers, many industries fulfilled ahead of schedule the planned objectives set for them to accomplish for the first helf year. Increases were observed to be manifold in some cases. At the Peking Leather Works, hides thrown into production were more than doubled, quantitatively speaking. New techniques and new products were constantly reported. For example, aluminum and chrome-tanned sole leather and sulphur-tanned ball leather from Tientsin City and pigskin leather rollers from Shanghai City for use in textile mills disproved the old view that only quality leather should be used for the manufacture of rollers. In Tientsin, leather was colored using dyestuffs and the tanning process was accelerated by using low voltage electric power, greatly shortening production hours. By developing a new technique of dyeing skins before tanning, a light industrial school of Shanghai City virtually revolutionized leather production procedures and greatly broadened the application of dyestuffs. From various areas came new creations in equipment improvement, gradual substitution of handwork by machines and reduction of manual labor intensity. It was customary for the masses actively to improve equipment by working as carpenter and blacksmiths. In Tientsin, an interior scraping machine was converted into a combination machine for three different operations, and wood was used for the manufacture of a leather scraping machine. To adapt the leather industry to "iron as principle" concept, priority was given to the development of heavy industry and the harvesting of bumper crops in farm production so as to satisfy the increasing needs of the working class. The

question arose: How should the leather industry be organized to achieve this leap-after-leap advancement?

Procurement and supply of skins at that time was fairly tight. Data from the animal by-products departments indicated that for the January-May period 1958 there was a drop of 53.27 percent in the purchase of cowhide compared with a corresponding period a year ago, and a decrease in cattle slaughter for the comparable period was also noted. To depend solely upon cowhide for the advancement of the leather industry and the Great Leap Forward in production was impossible. Then, what should be done?

(1) Active expansion of pigskin leather making: Pig crops are big and the rate of slaughter is high. The hog industry has advanced rapidly as farmers engage in Great Leap Forward production. Hog raising in 1958 already reached 180 million head, which was a dependable resource for the leather industry. Only through a constant expansion of the pigskin leather indust y could valuable cowhide leather be rationally applied and its export volume be enlarged. Some concrete problems such as the pigskin splitting technique and price remained to be dealt with if expansion of this industry was to be realized. But these problems could be resolved satisfactorily as shown by the experience gained in Shangung Province where people submitted reports to local Party committees and actively appealed to them for guidance and support, coupled with full coordination from the leather production departments concerned.

(2) Full utilization of marine by-products for leather making: In 1955 shark and river boar skins were successfully turned into leather. But general promotion and comprehensive utilization of marine by-products was handicapped by seasonal limitations and preservation and hauling difficulties. To accelerate the Great Leap Forward in leather production, it behooved the industry to seek cooperation actively from departments concerned with the preservation and full utilization of marine animal skins. In so doing, not only was a deficiency in a leather making resource made up but also a natural resource was substantially made use of. Hence, utilization of marine animal skins for leather manufacture should be considered as an important task to be performed.

LEATHER FACTORY PLAN (DRAFT): DAILY PRODUCTION OF 50 SKINS OF PIGSKIN LEATHER (01 MODEL) AND 100 SKINS (02)

[This is a translation of an article prepared by the Institute of Leather Research of the Light Industry Scientific Research Department appearing in <u>Chung-kuo Ch'ing-kung-yeh</u> (Chinese Light Industry), No 17, 13 September 1958, page 4.]

To develop the leather industry efficiently, rapidly and economically and to make it "bloom across the land" to meet the rapid growth of hog-raising enterprises on farms and to satisfy the farmers' need for shoes as well as to liberate women from domestic handicraft work and to strengthen rural man-power, two types of small scale pigskin leather factories with a daily production of 50 and 100 skins respectively were designed for general reference and adoption.

Data supplied by the Wei-hsin People's Commune of Sui-p'ing Hsien, Honan Province, as introduced by <u>Jen-min Jih-pao</u> on August 21, 1958, showed that it would be ideal for the commune to establish a small scale pigskin leather works with a daily production capacity of 50 or 100 skins since raw material was available and leather would be used for the manufacture of shoes to meet communal needs. The commune consisted of over 40,000 members. Computed at an annual average of 200 chin of pork per capita, 53,000 head of hogs of 150 chin each would be slaughtered annually. A supply of 15,000 or 30,000 skins would be made available if one-third or two-thirds of the hogs slaughtered were skinned. Figured at four pairs of shoes to each skin and 1.5 to 3 pairs of shoes per person, a supply of shoes for commune members would be assured.

To shorten the production cycle and simplify operations, chrome-tanned leather should be used for the manufacture of soles and shoe covers. Equipment would be of the multiple-application type in order to save steel, electric power and draft animal power. In view of our ignorance of local conditions and of differences in rural conditions, this plan was meant for general adoption. The local climate, direction of wind, hydrography, geology and topography would be taken into consideration and the plan would be further revised when the factory was established.

I. Principal Conditions For the Establishment of a Leather Factory

1. Raw material: Computed at 306 working days a year, 15,300 green skins for a factory with a daily capacity of 50 skins and 30,600 for a factory with a daily capacity of 100 skins would be needed. In case of a shortage in supply, hogs slaughtered on festival days, usually higher in number, should be pickled and preserved to balance the daily production.

2. Chemicals: For a pigskin leather works with a daily capacity of 50 skins, about 30,000 kilograms of chemicals would be needed annually, consisting of 16,500 kilograms of lime, 3,000 kilograms of red alum, 3,500 kilograms of sulfuric acid and about 7,000 kilograms of table salt. For a factory with a daily capacity of 100 skins, the amount would be increased proportionally. These chemicals should be kept in storage ready for use when necessary.

3. Water supply and drainage: About 13 tons of water for supply and drainage would be required to operate a leather works with a daily capacity of 50 skins and 32 tons for a factory with a daily capacity of 100 skins. The factory site should be located in an area where water is abundant. To facilitate drainage and to prevent contamination of drinking water, farm crops and fish ponds, the site should be elevated, preferable on the lower reaches of a river where communication facilities are available.

4. For sanitary reasons the site should be downwind from the residential area, and the glue making section should be downwind from the factory itself.

II. Products -- Kinds and Specifications

Kinds	Unit	Factory With a Daily Capacity of 50 Skins		Factory With a Daily Capacity of 100 Skins	
		Daily Capacity	Annual Capacity	Daily Capacity	Annual Capacity
Chrome-Tanned Pigskin Leather Uppers	Square Meter Per Skin	27/30	8,262/ 9.180	54/60	16,524/ 18,360
Chrome-Tanned Pigskin Leather Soles	Kilogram Per Skin	47.1/ 20	14,565.6/ 6,120	95.2/ 40	29,131.2/ 12,240
Pigskin Glue and Gelatin	Kilogram	4	1,224	8	2,448

Production is as planned; production time is determined as per local requirement.

STRUGGLE FOR COMPLETION OF THE NATIONAL PLAN

10-15 DAYS AHEAD OF SCHEDULE IN 1959

/This is a translation of an editorial appearing in Tsao-chih Kung-yeh (Paper Industry), No 11, 7 November 1959, pages 3,4,7,8./

Responding to the great proclamation issued by the Eighth Plenary Session of the Eighth All-China Party Congress exhorting people to "oppose Rightism, stimulate effort, increase production and economize consumption" the entire corpos of employees and workers of the paper making industry were engaged in a "great battle for the possession of paper" with high spirit and "sky-reaching" effort, accounting for a perpendicular rise in the production of paper in August. On September 29, an unprecedented high point of daily production -- 5218 tons -- was reached by 32 "key-point" enterprises and units. In September a national record high of 150,000 tons per month for the nine months in 1959 was attained. While celebrating the founding of the tenth anniversary of the Communist regime, the employees and workers of the paper making industry, clinging steadfastly to the front line of production, contributed to the national celebration with their heroic labor. The battle continued even after the anniversary was over. According to statistical figures ending at the middle of October, machine-made paper production volume for the whole nation was cumulatively estimated at 1,250,000 tons. In other words, in a brief period of nine and a half months, the workers fulfilled a production quota comparable to the figure for 1958 when the Great Leap Forward was in full swing. The development of small indigenous type paper mills was phenomenal, and by the end of September the number of units had risen from 718, when the Cheng-chou Conference was held, to 915. During this period, units that measured up to planned production capacity also rose from 42 to 125, demonstrating that under the Party's general line for Socialist construction, especially under the stimulation of the proclamation issued by the Eighth Plenary Session of the Eighth All-China Party Congress, employees and workers of the paper industry had made tremendous progress in production with their heroic labor.

To lead industrial production by conducting a mass movement also yielded effective and precious exper-

ience after the inception of the Great Leap Forward as shown by the peak production attained in 1958. The industry had profited by accumulated experience from the conduct of mass activities. By combining a mass movement with centralized direction, a technological revolution with entrepreneurial administration and a labor contest with planned control, the Canton Paper Mill fulfilled the national plan for January-September 1959 under the guidance of Provincial Party Committee and popular support. Notable results were also achieved at Yin-k'ou and Chia-mu-ssu paper mills. These three mills were singled out as progressive units by delegates to the Labor Heroes Conference.

Partial List of Names and Locations of
Paper Mills in China

Name	Location
Kuo-feng Paper Mill	Shanghai City
China Paper Board Company	Shanghai City
China Cement Co. (Paper Bag Factory)	Shanghai City
Li-hua Paper Mill	Shanghai City
Chia-mu-ssu Synthetic Pulp Works	Heilungchiang
Tientsin Paper Mill (Head Office)	Hopei
T'ang-shan Paper Mill	Hopei
Tientsin Paper Making Machine Works	Hopei
Tientsin People's First Paper Mill	Hopei
Shih-hsien Paper Mill	Kirin
Public-Private Jointly Operated Chen-chiang Paper Mill, An-tung	Liaoning
Fu-shun State-Local Jointly Operated Tung-chieh Paper Mill	Liaoning
Yin-k'ou Paper Mill	Liaoning
Tai-yuan Paper Mill	Shansi

(continued)

Wen-chou Li-t'ien Paper Mill	Chekiang
Sui-ch'ang Hsien Paper Mill	Chekiang
Hua-feng Paper Mill	Chekiang
Hsin-hsiang Paper Mill	Honan
I-ping Paper Mill	Szechuan
Public-Private Jointly Operated Chia-tung Paper Mill	Szechuan
Provincial Kuei-yang Paper Mill	Kueichow
Shao-yang Paper Mill	Hunan
Kan-nan Paper Mill	Kiangsi
Canton Paper Mill	Kuangtung
Provincial Nan-p'ing Paper Mill	Fukien
Fukien Chiang-tung San-yuan Paper Mill	Fukien
Shantung Paper Mill (Head Office)	Shantung
Chao-wu-ta League Chih-feng Paper Mill	Inner Mongolian Autonomous Region
Chung-wei Hsien Paper Mill	Hui-tsu Autonomous Region
Wu-hsi Li-yung Paper Mill	Kiangsu
Chiang-ying Hsien, Chiang-ying Paper Mill	Kiangsu Province
Yen-ching Paper Mill No. 1	Peiping City
Tsitsihar Paper Mill	Heilungchiang
Tai-lai Hsien Paper Mill	Heilungchiang
Pai-ch'eng-shih Paper Mill	Kirin

(continued)

Lin-chiang Paper Mill	Kirin
Kirin Provincial Paper Mill	Kirin
Shen-yang Paper Mill	Liaoning
Hsin-min Paper Mill	Liaoning
Chin-ch'eng Paper Mill	Liaoning
Pai-chen Paper Mill No 1	Liaoning
Yin-k'ou Paper Mill	Liaoning
Antung Paper Mill	Liaoning
Tientsin Paper Mill (Head Office)	Hopei
Tientsin People's Paper Mill No 3	Hopei
Hung-yeh Paper Mill	Kiangsu
Anhwei Paper Mill	Anhwei
Ch'ing-tao Paper Mill	Shantung
Chang-chiu Min-chui Paper Mill	Shantung
Kiangsi Paper Mill	Kiangsi
I-ping Paper Mill	Szechuan
Chung Hsien Paper Mill	Szechuan
Yun-feng Hsien Paper Mill	Yunnan
Ying-chiang Hsien Paper Mill	Yunnan
Yung-p'ing Hsien Ts'ao-chien Paper Mill	Yunnan

THE GLORY AND DETERMINATION OF THE ENTIRE CORPS

OF EMPLOYEES AND WORKERS OF THE PAPER INDUSTRY

/This is a translation of an item written by a correspondent appearing in Tsao-chih Kung-yeh (Paper Industry), No. 11, 7 November 1959, page 9./

During the past decade since the founding of the Communist regime, particularly in 1958 and 1959 when the Great Leap Forward was in full swing, the paper industry of Old China had developed rapidly on the heels of capitalist countries. In 58 years from the manufacture of the first machine-made paper to the founding of New China, the peak production level was barely 165,000 tons while the figure for 1949 including hand-made paper did not exceed 228,000 tons. Since the establishment of New China, the gross production figure for the period ending in 1958 actually reached 1,630,000 tons. For 1959, the production figure would be over two million tons as a preliminary estimate. The increase in ten years was almost tenfold -- an increase of over 300,000 tons from year to year. Compared with the rate of growth under Old China, this annual increase almost doubled the figure.

A DECADE OF SCIENTIFIC RESEARCH WORK IN THE PAPER INDUSTRY

/This is a translation of selections from an article prepared by the Institute of Paper Making of the College of Scientific Research Planning, of the Ministry of Light Industry, appearing in Tsao-chih Kung-yeh, No 11, 7 November 1959, pages 11-13./

Until the Liberation in 1949, the annual volume of paper production amounted to only 228,000 tons, or an average of 0.4 kilogram per capita per annum. Under such circumstances research work could hardly be undertaken.

By 1958 non-wood-fiber raw materials already accounted for over 75 percent of the resources used for paper making. The growth conditions of plant fiber raw materials during the First Five-Year Plan period was as follows:

	1953	1957
Ricestraw Consumed	100	184.57
Reeds Consumed	100	156.50
Bamboo Consumed	100	316.60
"Lung-hsu-ts'ao" and Other Plant Fibers Consumed	100	748.40

As for production technique, the old-style long-web machine speed was generally estimated at 100 meters per minute but with constant development of new techniques and automatic devices controlling breakage it was stepped up to 150 to 200 per minute while advanced enterprises even did 270 meters per minute. Among outstanding features was the adoption of a circular-net machine. Many people having implicit confidence in long-web rather than circular-net machines labored under the mistaken impression that "the latter had already accomplished its historic mission", not impressed by the fact that the production capacity of circular-net machines accounted for about 60 percent of the paper making in China, including machines for the production of paper board. In unit proportion, circular-net machines constituted 80 percent of the paper making machines in China. Also, in view of the fact that this model was mainly

used for the production of "cultural" paper, its improvement would contribute directly to support of the cultural revolution. Included among other advantages were a low investment cost, easy capital construction and high maneuverability of production in line with our policy of using non-wood-fiber raw materials in paper amking for the support of large and medium enterprises in particular and medium and small enterprises in general. Hence its improvement in production technique would be construed as being realistically significant in the present "increase-production, conserve-resources movement", which would be of even more far-reaching significance to the future growth of paper making industry in China. At the Shantung Paper Mill (Head Works), the circular-net was kept air-tight, by a pumping device, to accelerate the removal of moisture and to step up the machine speed. These units already penetrated through the major barrier of 100 meters per minute while most advanced units were credited with a speed of 185 meters per minute. Accompanying the development of the air-tight circular web was the successful experimentation of an axleless vacuum circular-net by the Pao-shan Paper Mill, Shanghai. By increasing its vacuum, the machine speed was known to have increased by about 40 percent compared with the Shantung mill.

STUDIES AND PRODUCTION EXPERIENCES ON BAMBOO PULP FOR PAPER MAKING

/This is a translation of selections of an article prepared by Paper Mill No 601 appearing in Tsao-chih Kung-yeh, (Paper Industry), No 11, 7 November 1959, pages 23, 24, 28, 29./

During the past decade, production of high-grade paper with bamboo fiber achieved definite results under Party's correct guidance. As far back as 1956, 100 percent bamboo pulp was employed in China for the manufacture of lithographic and typewriting paper, and by adding some ingradients to the pulp it was possible to produce "ch'ing-k'o", teletype, industrial and technical papers. Only through many trials were difficulties finally overcome in producing high-grade paper with bamboo fiber as raw material. In early Liberation period, only small amounts of bamboo pulp board and bamboo fiber pulp compounded with forms of pulp were used to produce poor quality printing and writing paper but after repeated testing, lithographic printing paper was produced in 1953 with ingredients containing bamboo, peeled bamboo and semi-prepared pulp. In 1956 standard lithographic and type writing paper was manufactured with 100 percent bamboo pulp. To meet growth needs after expansion in 1957, boiling advanced from the unitary preparation of pulp to integration -- from bamboo corresponding in kind and age to ones different in kind and growth. The principal testing experiences and production factors for the preparation of pulp in past years were recounted as follows:

I. Utilization of Bamboo Resources

A. General report on bamboo as paper making material: Bamboo is a plant of "single seed leaf" family, multifarious in variety varying from 0.6 to 20 centimeter in diameter; its length varies from a low of 30 centimeters to a high of 30-40 meters. Its chemical composition and fiber characteristics are shown as follows:

Table 1

A 原料品种及产地	B 水分(%)	C 灰分(%)	D 热水抽出物(%)	E 1%NaOH抽出物(%)	F 苯醇抽出物(%)	G 木質素(%)	H C.B.纖維素(%)	I α-纖維素(%)
1 合江 3 原慈竹(嫩竹)	9.96	2.9	14.18	20.69	2.76	18.59	59.53	—
合江 4 一年生慈竹	10.12	3.69	9.81	20.54	3.68	23.98	54.63	39.6
合江 5 原黄竹(嫩竹)	8.55	2.23	11.22	22.47	2.48	18.98	56.07	45.78
合江 6 一年生黄竹	9.72	2.14	14.35	18.49	3.08	22.11	52.07	42.20
合江 7 二年生黄竹	8.02	4.42	11.26	19.72	7.19	22.71	57.12	42.78
合江 8 一年生白夹竹	11.02	1.88	5.55	22.14	1.43	22.97	64.12	49.02
合江 9 靛青竹(嫩竹)	10.12	—	6.45	22.91	2.90	19.35	65.45	48.85
2 納溪 10 靛青竹(嫩竹)	10.10	0.71	3.90	22.68	1.31	20.75	64.32	49.95

Legend for Table 1

A-Production Center - Name of Raw Material

B-Moisture Content

C-Dirt Content

D-Extraction in Hot Water (%)

E-1% NaOH Extraction (%)

F-Benzene, Alcohols Extraction (5)

G-Lignin

H-Cellulose C.B.(%)

I-Cellulose a-(%)

1-Ho-chiang 3-Yuan-t'zu Bamboo (tender)

Ho-chiang 4-One-year Growth

Ho-chiang 5-Yellow Bamboo (tender)

Ho-chiang 6-One-year Growth (yellow)

Ho-chiang 7-Two-year Growth (yellow)

Ho-chiang 8-One-year Growth (white)

Ho-chiang 9-Soaked Bamboo (tender)

2-Na-ch'i 10-Soaked Bamboo (tender)

In texture, bamboo joints and residues, sheaths and stems vary in composition. In view of the fact that improper treatment would cause yellowish blemishes and spots to appear on the paper, an analysis of the lignin and C.B. cellulose content in T'zu-chu (tender bamboo) and soaked bamboo was made by Paper Mill No 601, the results being shown in Table 2.

Table 2

Item	Whole Bamboo	Joints	Sheaths
Lignin Content (%)	19.35	24.51	25.33
C.B. Cellulose Content (%)	65.45	52.31	50.48

For the production of high quality paper, joints and sheaths should be removed but for the manufacture of ordinary paper this situation could be corrected by improving the boiling method.

Also, the C.B. fiber content varied as the bamboo species differed, high in white variety compared with the yellow and tender species. On the basis of such an analysis a relationship between production ratio and the boiling test was worked out. An abnormally low production ratio indicated that fibers were damaged during pulp preparation, necessitating an immediate remedy.

B. Fiber characteristics: Fibers are like ribbons, tapering off at both ends, 0.6 to 4.5 or an average of 2.0 millimeters in length and 0.01 millimeters in width, or a ratio of 200 to 1. In Table 3 length, width and cell wall thickness of bamboo, wood and wheatstalk fibers were shown.

As indicated in Table 3, bamboo fibers by their fineness and length excel in the manufacture of paper where cohesion, porosity and absorption of resin, filler and printing ink are required. These fine fibers and firm cell structures are adapted to crushing by heavy devices and free-beating by reason of their tenacity and resistance to abrasion but they are liable to entanglement while cells possess better suspension strength. This free-beating of long fibers results in shorter fibers in prepared bamboo pulp compared with woodpulp fibers and condensation of bamboo pulp is also lower than that of woodpulp.

Besides, bamboo pulp prepared with sulfates is comparable to deciduous woodpulp but larger than evergreen woodpulp in semi-fiber content. A higher index was noted

in the rate of preparing bamboo pulp compared with woodpulp. Free-beating by heavy devices of bamboo pulp was adequate from the standpoint of hydrolysis.

Table 3

A 原料名称	B 纖維長度（毫米）		C 纖維寬度（毫米）	D 長寬之比	E 纖維細胞壁厚度（微米）	F 备註
1 白夹竹	0.64~5.28	(1.93)	0.0096	200	—	8 化龙桥造纸試驗場数据
2 慈竹	0.70~5.40	(1.90)	0.0126	198	5.6	化龙桥造纸試驗場数据
3 西凤竹	0.70~4.30	(1.78)	0.0094	212	—	化龙桥造纸試驗場数据
4 黄竹	0.60~4.27	(2.00)	0.0122	164	—	化龙桥造纸試驗場数据
5 木材（针叶）	1.3~5.6	(3~4)	0.040	100	3.0	Grant
6 木材（阔叶）	0.8~1.7	(1.3)	0.025	50	3.5	Grant
7 麦草	0.3~2.0	(0.8)	0.015	53	5.2	Grant

9 註，括號內的數字是指大部分的纖維長度。

Legend for Table 3

A-Name of Raw Material

B-Length of Fiber (Millimeter)

C-Width of Fiber (Millimeter)

D-Length-Width Ratio

E-Cell-Wall Thickness (wei-mi)

F-Remarks

9-Note: Figures in brackets refer to fiber length of most species.

1-Pai-chia-chu (white)

2-T'zu-chu (tender)

3-Hsi-feng-chu

4-Huang-chu (yellow)

5-Timber (evergreen)

6-Timber (deciduous)

7-Wheatstalk

8-Hua-lung-chiao Paper Mill Laboratory Figure

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" " "

Grant

Grant

Grant

II. Selection and Storage of Material for Bamboo Pulp Preparation

After removing tips and sheaths, the bamboo is split into strips of 25 millimeters in width and 1.3 meters in length. The joints are crushed, packed and transported to the plant for chopping and boiling. According to rural methods of treatment, bamboo is classified under three categories -- yüan-chu or original bamboo, soaked bamboo and semi-prepared bamboo. When bamboo is sent to the plant after it is cut and dried, it is known as "yuan-chu". It is termed "t'o-ch'ing-chu" or soaked bamboo if it is immersed in clear water for about two months after it is cut. Bamboo is sometimes soaked in a tank for about 15 days, taken out, dried and boiled in an open vessel for 12 hours after soda ash of 7 percent strength (containing 75 percent sodium carbonate) is added. It is dried after the elimination of the black fluid. This material is known as "pan-shou-liao" or semi-prepared material. In boiling, less soda ash (computed according to NaOH) by 1 percent is used for soaked bamboo than for original bamboo while the semi-prepared material is boiled in a solution containing less soda ash by 2 percent compared with "yuan-chu". In terms of production ratio, "to'o-ch'ing-chu" and "yuan-chu" are about the same while "pan-shou-liao" is higher than "yuan-chu" by 1.5 percent. Original bamboo is preferable to soaked bamboo or semi-prepared material since less processing is involved. But in the interest of producers possessing the necessary tools and for the utilization of man-power, vast quantities of soaked bamboo and semi-prepared material were used for a considerable period of time until after 1957 when only original bamboo was accepted.

In regard to bamboo species, Mill No 601 used as a rule pai-chia-chu, t'zu-chu, hsi-feng-chu and huang-chu. The first mentioned variety is preferred because of its loose texture, easy access to soda ash solution, low consumption of soda ash and high production ratio and fiber tensile strength. T'zu-chu and huang-chu follow in the order of these qualities.

In the order of growth period, bamboo is classified as tender (less than a year), one-year, two-year and three-year growth (a mature growth).

Tender bamboo is lower in wood fiber and higher in fiber element content and is capable of being treated with less soda ash while its higher water content, greater decomposability, lower storability and shorter cutting period may be mentioned as its drawbacks. Mature bamboo may be cut at any time and can be stored easily but it has a higher wood fiber and a lower fiber element content.

Semi-prepared material is not inviting for vermin during storage because it is boiled in a solution containing 7 percent soda ash. "T'o-ch'ing-chu" is also less inviting to attack by vermin and more storable because it is rid of soluble starch and resin during immersion. But "yuan-chu", especially tender species, is liable to become worm-eaten and is not easily storable because it contains starch and resin. Vast quantities of "yuan-chu" are used in order to lower the cost of production. Processing on the farm is unsatisfactory under existing circumstances. Tests were conducted at the mill with the object of solving the problems of storage and pests. The bamboo was sprayed with insecticide (666), and the worm-eaten bamboo was fumigated with sulphur satisfactorily (research in this regard was given in brief). According to farmers' experience, bamboo felled in spring is far more inviting to vermin than that cut in winter. The truth of this statement remains to be proved. Apart from attack by vermin, measures should be taken against formation of mold. Residual water content in bamboo strips should be taken out and reduced to a minimum of 12-14 percent before they are stored. Storage rooms should be well ventilated.

III. Boiling Tests on Mixed Materials

To meet the growth requirements of production, the use of bamboo must be broadened. Included in this test are the following items: measurement of bamboo fibers of various length and width, solubility of wood fiber element in 1 percent NaOH solution, mixed boiling of mature and other species of bamboo and the effect of the liquid ratio and boiling time on tender bamboo species.

Table 10 shows the comparative length and width of paper pulp making bamboo fibers.

Explanatory note: T'zu-chu, huang-chu and pan-chu are identified with their comparatively long fibers while p'ing-chu, mu-chu, fang-chu and leng-chu are characterized by their shorter fibers. The difference in width is mostly irregular. Fang-chu fibers average only 1.012 millimeter in length, even shorter than fibers used for the production of pulp for lithographic printing paper. Difficulties would be encountered if these short fibers were used without compounding.

Table 10

A 竹種	B 竹齡	C 纖維長度（毫米） D 平均長度	E 0.88以下 (%)	0.88—1.76 (%)	1.76—2.67 (%)	2.67—3.53 (%)	F 3.53以上 (%)	G 纖維幅度（微米） H 平均	I 最寬	J 最窄
1 慈竹	10 嫩竹	1.646	16.96	45.65	24.79	10.43	2.17	14.3	28.[illegible]	4.0
	11 二年生	1.664	16.19	41.43	31.43	8.57	2.38	12.4	20.0	2.7
	12 三年生	1.726	17.56	41.46	24.39	13.17	3.41	14.2	27.0	3.6
2 黃竹	13 一年生	1.520	17.00	49.00	26.00	8.00	—	—	—	—
	11 二年生	1.63	17.09	44.03	27.97	7.25	3.63	13.11	28	3.6
	12 三年生	1.64	11.52	47.46	31.33	8.76	0.92	14.5	32	6.3
3 斑竹	14 老竹	1.66	14.61	44.72	30.14	9.13	1.37	14.6	31.5	2.7
4 平竹	11 二年生	1.26	28.12	50.89	18.30	2.68	—	10.6	21.6	2.7
5 木竹	13 一年生	1.35	24.75	54.04	16.16	3.57	1.51	11.8	28.0	4.5
6 方竹	13 一年生	1.012	42.67	46.55	10.34	0.43	—	10.9	22.5	3.6
7 毛毛竹	14 老竹	1.362	23.64	50.45	23.18	2.73	—	—	—	—
8 冷竹	11 二年生	1.494	15.00	58.00	22.00	5.00	—	—	—	—
9 干巴竹		1.915	13.18	41.86	25.62	14.73	6.20	—	—	—

Legend for Table 10

A-Species

B-Growth

C-Fiber Length (Millimeter)

D-Average Length

E-Under 0.88 (%) 0.88-1.76 (%) 1.76-2.67 (%) 2.67-3.53 (%)

F-Over 3.53 (%)

G-Fiber Width (Wei-mi)

H-Average

I-Widest

J-Narrowest

1-T'zu-chu 10-Tender Specie
11-Two-year
12-Three-year
13-One-year
2-Huang-chu 11-Two-Year
12-Three-year
3-Pan-chu 14-Mature Specie
4-P'ing-chu 11-Two-year
5-Mu-chu 13-One-year
6-Fang-chu 13-One-year
7-Mao-mao-chu 14-Mature Specie
8-Leng-chu 11-Two-year
9-Kan-pa-chu

PRODUCTION OF LITHOGRAPHIC PRINTING PAPER

WITH 100 PERCENT RICESTRAW PULP

/This is a translation of selections of an article prepared by the Fine Pulp Production Research Committee of Li-hua Paper Mill appearing in Tsao-chih Kung-yeh (Paper Industry), No 12, 7 December 1959, page 4./

In the past, Li-hua Paper Mill depended on imported wood and reed pulp for production of paper board, accounting for over 80 percent of the pulp consumed. In 1952 work was begun on the manufacture of convex printing paper with a mixture of 25 percent ricestraw pulp but production volume was low and quality was poor. In 1954 lithographic printing paper was manufactured with a mixture of 25 percent ricestraw pulp. Because of the presence of dirt, there were 500-1,000 yellow spots per square meter and the finished product was rated substandard. Then, by regulating production techniques and by improving operations, the quality of ricestraw pulp was elevated and single-side lithographic printing paper was manufactured with 50 percent ricestraw pulp in the mixture. Consumers were satisfied as quality was improved. But the question arose: Could quality be further improved to produce high quality paper? Further probing was required in coping with problems of ridding the pulp of excessive moisture and of drying on a long-web machine. In 1958 a research unit for examination of special problems was formed with the Shanghai Paper Industrial Company, the Paper Making Planning Department and the Li-hua Paper Mill as participants. A few hundred tests were conducted on new production procedures and technical factors. During the Great Leap Forward period, the Party pointed out the necessity of doing away with superstition, liberating thinking and broadening the use of plants to overcome difficulty in manufacturing ricestraw pulp. Not only should more straw pulp be introduced but also 100 percent ricestraw pulp should be used for the production of superior quality paper. In 1959 an item entitled "utilization of straw fibers for the production of high-grade cultural paper" was embodied in Principal Light Industry Scientific Research Plan by the Ministry of Light Industry and Light Industry section of National Scientific Committee, and it was demanded that "100 percent straw fibers be employed for the manufacture of convex printing and copper plate

printing paper on long-web machine at a speed exceeding 100 meters per minute and that printing needs be met in quality."

This further strengthened our conviction and determination. Under the Party's support, four large scale production tests were undertaken and production procedure was adjusted without compromising the existing straw pulp production system with simple equipment. Under the direction of the Shanghai Paper Industry Company and the Paper Making Institute of the Scientific Research Department of the Ministry of Light Industry and with the cooperation of the entire corps of employees and workers of Li-hua Paper Mill, bleached ricestraw pulp was manufactured under a new production technique on September 9, 1959 and grade I lithographic printing paper was produced with 100 percent ricestraw pulp on September 13. During these operations, the machine speed was set at 104 meters per minute. Not only was movement normal but also the quality of product measured up to the standard set by the Ministry of Light Industry. This achievement was regarded as a tribute to the great Tenth Anniversary of the founding of Communist China.

As for mass production estimate, bleached, sulfate-treated ricestraw pulp used in the manufacture of Grade I lithographic printing paper could be produced at a cost of about 600 yuan per ton, which was lower in production cost than bleached, sulfurous acid treated woodpulp board manufactured by the Kai-shan-t'un Paper Mill. According to June 1959 data, the production cost was placed at 731 yuan per ton. Of the figure of 600 yuan per ton, alkali accounted for about 30 percent. By reclaiming the loss in black fluid and by utilizing by-products, a further drastic lowering of production cost was possible.

Legend for Table 5

A-Name of Mill

B-Li-Hua September 13, 1959

C-Li-hua September 13, 1959

D-Shih-hsien July 4, 1959

E-Date

Table 5

1 指标名称	制造厂名 A	利华 B	利华 C	石岘 D
E 日期		1959年9月13日	1959年9月13日	1959年7月4日
1 指标名称	22 部颁一号胶版印刷纸标准	27 100%稻草浆胶版印刷纸	27 100%稻草浆胶版印刷纸	32 100%亚硫酸木浆胶版印刷纸
2 重量（克/平方厘米）	23 70,80,90,100 ±5%	59.5	58.3	97.3
3 体积重量（克/立方厘米）	24 不小于0.75	0.86	0.9	1.02
4 平均裂断長（米）	不小于2400（二等品2280）	3380	2739	3010
5 施胶度（毫米）	不小于0.75	1.0	0.75	1.0
6 白度（%）	不小于80	85	83	85
7 水份（%）	7±2	7.0	6.0	7.6
8 平滑度（秒）	25 反正面不小于10	—	30 正190，反128	—
9 耐折度（双折次）	不小于8	11½	14	—
10 灰分（%）	不小于10	18.9	—	22
11 尘埃度0.5~2.0毫米	26 不大于175（二等品210）	159	197△	173
12 2.0毫米以上	0	0	0	—
13 变形（%）浸湿后 縱	不大于 +0.5	+0.25	+0.2	+0.25
14 横	不大于 +2.5	+1.5	+1.01	+1.96
15 干燥后 縱	不大于 −0.75	−0.25	−0.7	—
16 横	不大于 −1.0	−0.5	−0.85	—
17 配比（%）：				
18 漂白亚硫酸木浆				85
19 阔叶树木浆				15
20 一号胶版纸稻草浆		100	100	
21 备註		28 利华厂检驗	31 上海市輕工業研究所造紙室檢驗	

33 註：1. 有×者表示不合格，有△者表示符合二等品标准。
2. 石岘造纸厂数据系石岘造紙厂紙样上注明的，利华造紙厂数据是由本厂与上海市輕工業研究所造紙研究室測定的。

1-Standard	22-Standard for grade I lithographic printing paper as proclaimed by the Ministry
2-Weight (gram per square centimeter)	23-70,80,90,100 ± 5%
3-Volume Weight (gram per cubic centimeter)	24-Not less than 0.75 Not less than 2400 (grade II 2280)
5-Glue Content (millimeters)	Not less than 0.75
6-Whiteness (%)	Not less than 80
7-Moisture Content (%)	7 ± 2

8-Smoothness (second)	25-Negative and Positive Side not less than 10
9-Folding Resistance (double folding time)	Not less than 8
10-Dirt (%)	Not less than 10
11-Blemishes 0.5-2.0 Millimeter	26-Not greater than 175 (Grade II 210)
12-Above 2.0 Millimeter	0
13-Shrinkage(%) After Wetting Vertical	Not greater than +0.5
14-Horizontal	Not greater than +2.5
15-After Drying Vertical	Not greater than -0.75
16-Horizontal	Not greater than -1.0

17-Ingredient Ratio

18-Bleached, Sulfurous Acid Treated Woodpulp

19-Broad-leaf Woodpulp

20-Grade I Ricestraw Pulp for Lithographic Printing Paper Manufacture

21-Remarks

27-100% Ricestraw Pulp for Lithographic Printing Paper	29-100% Ricestraw Pulp for Lithographic Printing Paper	32-100% Sulfurous Acid Treated Woodpulp for Lithographic Printing Paper
28-Inspected at Li-hua Mill	30-Positive 190, Negative 128	31-Inspected at Paper Section of Shanghai Light Industry Industria Research Institute

33-Notes: 1. x indicates substandard production; Δ indicates compliance with grade II production standard.

2. Shih-hsien Paper Mill figures are shown in the samples while figures in respect to Li-hua Paper Mill were determined by the Mill in conjunction with the Paper Making Research Section of the Light Industry Research Institute of Shanghai City.

RESEARCH REPORT ON EXPERIMENTAL PRODUCTION OF RAYON PULP WITH RICESTRAW AND COTTONSTALK

/This is a translation of an article jointly written by Chang Cheng-ya, Li Yung-ts'ai, Wang Hou-chi, Lin Shan-ch'ing, Hsu I-ch'iung and Kuan Kuo-hua of Institute of Chemistry, Wu-han Branch, Academia Sinica, appearing in Tsao-chih Kung-yeh, No 12, 7 December 1959, pages 26,27./

In point of production volume, ricestraw and cotton-stalks are considered as important farm by-products in China as they contain over 40 percent cellulose, which is economically significant as raw material for the production of synthetic fiber. Conclusion from recent research and experimental work in China indicated that it was basically possible to develop fibers from herbage. Important results from a systematic study on bagasse fiber were obtained and a well defined production technique was chosen in trying to prepare pulp with other raw materials.

This study was concerned with ricestraw and cotton-stalks. Their chemical compositions were examined and accomplished results in China were used as reference; proper production factors were adopted for the manufacture of bleached pulp; and an analysis of finished products at various stages together with a certification of the quality of bleached pulp was undertaken to explore the possibility of preparing rayon pulp and to pave the way for further testing in this regard. Finally, appropriate factors for production of pulp with ricestraw and cottonstalks were brought up.

I. Raw Material

The Ricestraw and cottonstalks used by us were supplied by an experimental farm of the Institute of Agricultural Science Research of Hupeh Province. Cottonstalk was labeled with the character "tai", No 15, and harvested in August 1958 while ricestraw was of the "ssu-shang-yu" strain harvested in late 1958.

Stripped of leaves and heads, the ricestalks were cut into strips 2-3 centimeters long; and the cottonstalks were chopped into short strips of 1.5-2 centimeters long and then crushed into flakes after removing stems and roots. After measurement of their moisture content, they were stored separately in hermetically sealed glass containers.

An analysis of these raw materials was shown in Table 1 and other materials were listed for comparison.

Table 1
Ricestraw and Cottonstalk -- Their Chemical Composition As Compared With Those of Other Materials

A 化學成份 / H 原料	B 灰份 (%)	C 灰份中酸不溶物 (%)	D 全纖維素 (%)	E 多縮戊糖 (%)	F 苯—醇抽出物 (%)	G 木質素 (%)
1 稻草	11.68	85.73	43.52	20.54	2.06	18.97
2 棉稈	1.58	11.30	45.63	16.44	1.61	19.85
3 蘆葦	4.73	—	57.60	30.68	4.19	18.98
4 小麦稈	8.03	—	49.17	22.00	6.42	15.02
5 蔗渣	1.15	—	64.65	23.84	1.73	20.56
6 小叶樟	4.61	—	45.86	26.70	12.13	21.25
7 大豆稈	2.61	—	60.02	18.09	2.71	18.06

Legend for Table 1

A-Chemical Composition

B-Ash (%)

C-Insoluble Ash in Acid

D-Cellulose (%)

E-Pentosan (%)

F-Benzene & Alcohol Extracts (%)

G-Lignin (%)

H-Raw Materials

1-Ricestraw

2-Cottonstalks

3-Reeds

4-Wheatstalk

5-Bagasse

6-"Hsiao-yeh-chang"

7-Soybean Stalks

Notes: (1) Insoluble ash in acid was analyzed as per Soviet Formula from "Paper Makers' Handbook", page 794, published by Light Industry Publishers, 1957.

(2) Cellulose and lignin contents were net without ash. Ricestraw when treated with 72% H_2SO contained 34.93% ash in insoluble substances and showed 14.35% ash when treated with ethyl alcohol nitrate. Treated cottonstalk generally showed less than 2% ash in insoluble matter.

(3) Pentosan content figure in soybean stalks was derived from an original report on furfural growth ratio times 1.38.

II. Preliminary Hydrolysis

Compared with ricestraw, cottonstalks, while containing a lower amount of cellulose showed also a less amount of cinders, lignin and pentosan, the pulp being well suited for the production of rayon. Ash content in ricestalks was particularly high while insoluble matter in acid accounted for over 85 percent, other constituents being normal. The pentosan content was lower than that of wheatstalk or bagasse or "hsiao-yeh-chang". It was felt at first that by adopting a corresponding or milder degree of hydrolysis applicable to bagasse (5) and "hsiao-yeh-chang"(4) pentosan content in ricestalk in semipulp form could be lowered to about 10 percent. Conditions for preliminary hydrolysis to be adopted were shown in Table 2.

High compression was of the electric oscillating type with an amplitude of 4.5 centimeters at 50 vibrations per minute from the rise in temperature during vibration to the termination of heating. The furnace was made of stainless steel and its capacity was one liter. Testing results shown in Table 2 demonstrated that the pentosan content was high when the temperature for hydrolysis was low. Only when the temperature was raised to 180°C could any drop in pentosan content be clearly noted. In reports already published there was difference of opinion regarding the influence of hydrolysis on ash content in pulp for rayon production (3)(5). It was indicated in testing that where the acid content of ash in insoluble substances was high (such as ricestraw) preliminary hydrolysis showed little effect in lowering the content of ash but it was effective when the acid content of ash in insoluble matter was low such as in cottonstalks.

The rate of yield from preliminary hydrolysis was lower in ricestraw than in cottonstalks or "hsiao-yeh-chang" or bagasse.

Table 2

Riceestraw and Cottonstalk: Testing Conditions For And Results of Preliminary Hydrolysis*

D 条件 \ A 原料		B 稻		草			C 棉		秆
1 编号		01	02	03	04	05	11	12	13
2 液比		1:8	1:8	1:8	1:8	1:8	1:8	1:8	1:8
3 最高温度 (°C)		160	165	170	180	140**	160	170	140**
4 升温时間 (分)		90	90	90	90	90	90	90	90
5 保温时間 (分)		60	60	60	60	60	60	60	60
6 降温时間 (分)		60	60	60	60	60	60	60	60
7 pH 值		5.07	4.67	—	3.86	5.27	4.05	3.85	4.10
8 半浆分析	9 收获率 (%)	72.47	62.19	59.23	52.10	—	76.59	72.38	86.62
	10 灰份 (%)	10.95	11.75	11.10	—	9.81	0.71	1.00	0.80
	11 多缩戊糖 (%)	22.70	21.43	19.93	9.56	24.01	13.80	10.37	18.19

12 * 进行本試験时因高压釜放气不便，在到达保温时間后即停止加热，使自然冷却至温度为100~110°C出料。

13 ** 最高温度为140°C的水解，水解液配成浓度为0.06%的H_2SO_4溶液。

Legend for Table 2

A-Raw Material

B-Ricestraw

C-Cottonstalk

D-Conditions

1-Numbering

2-Liquid Ratio

3-Maximum Temperature (°C)

4-Raising Temperature (Minute)

5-Preserving Temperature (Minute)

6-Lowering Temperature (Minute)

7-pH Value

8-Analysis of Semi-Pulp

9-Rate of Yield (%)

10-Ash Content (%)

11-Pentosan(%)

12- *Due to a defective release in the high compression furnace during testing, heating was stopped so that the temperature might drop of its own accord to facilitate discharge.

13- **Hydrolysis was performed at a maximum temperature of 140°C while the solvent was prepared at a concentration of 0.06% H_2SO_4 solution.

III. Boiling

Boiling was done in a high compression furnace similar to that used for preliminary hydrolysis. Boiling factors were shown in Table 3. In the absence of pulp selecting equipment, it was necessary to increase the pure alkali content to give full decomposition by boiling. Steam was released as the temperature subsided. The discharge was flushed until no trace of alkali was left. While ricestraw pulp appeared white and clear in color, the fibers were coarse and hard. On the other hand, cottonstalk pulp looked greyish and dark, and its fibers were soft and loose. From unbleached ricestraw pulp it was revealed that while its content was high, it dropped rapidly when it was treated by the sulfurous method. These satisfactory results disproved the general assertion that it was difficult to rid ricestraw of its ash. Pentosan content in unbleached cottonstalk pulp was already lower than that of bagasse pulp[5] but stability was noted in unbleached ricestraw pulp. Compared with other half-hydrolyzed pulps prepared from other grasses under similar conditions, the pentosan content of bagasse after boiling would decrease by 9.83 percent [5] (production volume of furfural multiplied by 1.36); that of "hsiao-yeh-chang" by 7.68 percent; and that of cottonstalk by almost 5 percent. Evidently, the pentosan in ricestraw was high in drug resisting power.

As for hardness, both unbleached ricestraw and cottonstalks were rather low, and it was especially true with ricestraw. Refining could be simplified by dispensing with the chlorination stage.

Table 3
Testing and Boiling Factors For Half-Prepared Ricestraw and Cottonstalk Pulp

A 原料 / D 条件	B 稻	草	C 棉	秆
1 编号	01	02	11	12
2 全碱(以Na_2O对绝干半浆%计)	24	26	25	27
3 硫化度(%)	30	30	30	30
4 液比	1:8	1:8	1:8	1:8
5 最高温度(°C)	165°	160°	170°	175°
6 升温时間(分)	90	90	90	90
7 保温时間(分)	90	90	90	90
8 蒸煮总时間(分)	180	180	120	180
9 收获率*(%)	27.98	26.68	24.78**	24.80**

10 * 按原料計算。

11 ** 选去較粗的未蒸开的纖維后的收获率。

Legend for Table 3

A-Raw Material

B-Ricestraw

C-Cottonstalk

D-Factors

1-Numbering

2-Pure Alkali (Computed as Na_2O Against Well-Dried Half-Prepared Pulp in %)

3-Degree of Sulfatization

4-Liquid Ratio

5-Maximum Temperature (°C)

6-Rise in Temperature

7-Heating (Minute)

8-Total Boiling Time (Minute)

9-Rate of Yield* (%)

10- *Computed According to Raw Material

11- **Yield Rate After Abandonment of Unboiled Coarse Fibers

Table 4
Quality of Unbleached Ricestraw and Cottonstalk

Index Name and No. of Unbleached Material		Potassium Permanganate (Value)	Ash (%)	Pentosan (%)	Lignin (%)	Cellulose (%)
Ricestraw	01	3.75	0.85	16.29	1.37	98.02
	02	4.44	1.13	17.48	3.06	93.86
Cottonstalk	11	8.27	1.23	5.35	1.38	99.80
	12	8.05	1.35	4.38	1.15	-

IV. Multiple-Stage Bleaching

Unbleached ricestraw and cottonstalks were to be refined according to conditions indicated in Table 5.

Table 5

Refining Conditions for Unbleached Ricestraw and Cottonstalks

D 漂白条件 / A 試料		B 未漂稻草浆			C	
1	編号	01		02	11	12
2 氯化，	氯用量(%)	2.79	1.65	2.00	3.56	3.75
3	温度(°C)	25	35	25	25	[illegible]
4	時間(分)	45	45	45	45	45
5	pH值	1.89	1.90	1.87	1.61	1.87
6 碱处理，	用碱量(%)	2	2	2	2	2
7	温度(°C)	72	72	72	72	72
8	時間(分)	60	60	60	60	60
9 漂白，	氯用量(%)	1.01	1.07	3.25	2.32	2.25
10	温度(°C)	28	23	23	23	28
11	時間(分)	160	180	150	180	180
12	pH值	7.83	11.35	7.95	8.07	7.90
13 酸处理，	酸用量(%)	1	1	1	1	1
14	温度(°C)	23	28	28	28	23
15	時間(分)	60	60	60	60	60

Legend for Table 5

A-Testing Sample

B-Unbleached Ricestraw

C-Unbleached Cotton-stalk

D-Bleaching Conditions

1-Numbering

2-Chlorination: Amount of Chlorine (%)

3-Temperature (°C)

4-Time (Minute)

5-pH Value

6-Treatment By Alkali: Amount of Alkali (%)

7-Temperature (°C)

8-Time (Minute)

9-Bleaching: Amount of Chlorine (%)

10-Temperature (°C)

11-Time (Minute)

12-pH Value

13-Treatment By Acid: Amount of Acid (%)

14-Temperature (^{o}C)

15-Time (Minute)

Notes:

1. Concentration of pulp at 3% during bleaching.
2. Amount of chemical agent to be used according to percentage of well-dried amount of intermediary product as yielded in a preceding operation.
3. 02_A, 02_B were unbleached pulp obtained under No. 02 boiling conditions and treated respectively under dissimilar refining conditions.

1198

-END-